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| 10/600,596      | 06/23/2003  | Satoshi Shibata      | 740819-1016         | 6775             |

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| EXAMINER |
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PRUCHNIC, STANLEY J

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| ART UNIT | PAPER NUMBER |
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2859

DATE MAILED: 03/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                                      |                                |  |
|------------------------------|--------------------------------------|--------------------------------|--|
| <b>Office Action Summary</b> | Application No.<br>10/600,596        | Applicant(s)<br>SHIBATA ET AL. |  |
|                              | Examiner<br>Stanley J. Pruchnic, Jr. | Art Unit<br>2859               |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 June 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☒ All    b) ☐ Some \*    c) ☐ None of:  
         1. ☐ Certified copies of the priority documents have been received.  
         2. ☒ Certified copies of the priority documents have been received in Application No. 09/984,908.  
         3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
     \* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
     a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) (3 sheets)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) A(1pg)
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Priority***

1. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 09/984,908 (hereinafter referred to as PARENT, filed on 31 October 2001).

### ***Drawings***

2. The proposed drawing correction, filed on 23 June 2003, has been APPROVED by the Examiner. Corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance.

### ***Specification***

3. Please correct the Specification, *e.g.*, in the "Description of the Drawings" section, to be consistent with the renumbering of "Fig. 11" now being the two figures, --Fig. 11A-- and --Fig. 11B-- in order to be consistent with the Approved Drawing Change.
4. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Double Patenting***

5. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The

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filing of a terminal disclaimer cannot overcome a double patenting rejection based upon 35 U.S.C. 101.

6. **Claims 1, 2, 4 and 6** are provisionally rejected under 35 U.S.C. 101 as claiming the same invention as that of **claims 1, 2, 4 and 9** of *copending Application No. 10/638,062*. This is a provisional double patenting rejection since the conflicting claims have not in fact been patented. These claims are identical.

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. **Claims 3 and 5** are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over **claim 7** of *copending Application No. 10/638,062* in view of *WO 98/57146 (cited by Applicant)*. Although the conflicting claims are not identical, they are not patentably distinct from each other, since the only difference is that Application No. *10/638,062* does not include Claim 3. Claim 7 only describes the temperature range wherein the claimed method will be practiced.

WO 98/57146 describes the prior art method as described in the instant specification, and further discloses, in Fig. 19, that the prior art method is already practiced within the temperature range 450 degree C to 600 degree C. The "first layer" described by WO 98/57146 is crystalline

silicon, which is considered to inherently have a transmittance increasing within said temperature range as claimed by Applicant in Claims 3 and 5.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to practice the method as claimed in Application No. 10/600,596 within a temperature range from about 450 degree C to about 600 degree C in order to determine the wafer processing temperature as taught by WO 98/57146.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by DUTARTRE (U.S. Patent No. 5,994,676).

DUTARTRE discloses a method for predicting, using a test wafer 10, a temperature of a wafer to be loaded into a lamp heating system (heating lamps 13 and 14) that generates heat (Col. 1, Lines 54-61), the method comprising the steps of:

a) preparing (step 20) the test wafer, which includes a first semiconductor layer 21 formed in a crystalline state, a second semiconductor layer 22 formed in an amorphous state on

the first semiconductor layer, and a light absorption film (Col. 4, Lines 44-48) formed over the second semiconductor layer;

b) loading (step 24) the test wafer into the lamp heating system and then irradiating the test wafer with a light emitted from the lamp, thereby heating the second semiconductor layer through the light absorption film;

c) calculating a recovery rate at which a part of the second semiconductor layer that has been heated recovers from the amorphous state to the crystalline state at the interface with the first semiconductor layer; and

d) measuring a temperature of the test wafer that has been irradiated with the light, according to a relationship (Col. 5, Lines 3-13) between the recovery rate and a temperature corresponding to the recovery rate. Broadly considered, the rate determined by DUTARTRE, at which the measured sheet resistance changes, comprises the “recovery rate” as claimed by Applicant, and the proportionality found by calibration (step 28) comprises the “relationship” as claimed by Applicant.

DUTARTRE discloses that the first semiconductor layer 21 is made of silicon (Col. 4, Lines 44-48) and the film is made of a silicon oxide (Col. 4, Lines 33-48). Because silicon oxide absorbs light of at least one wavelength, as do all materials, it is inherently a light absorption film as broadly claimed by Applicant.

11. Claims 1-5 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Pat. No. 6472232 B1 (**Johnson, Donna K. *et al.***, hereinafter JOHNSON).

JOHNSON discloses a test wafer using recrystallization rate to determine temperature in a range of 450 C to 625 C, determining the thickness of the recrystallized layer by measuring sheet resistance. The test wafer is used for predicting a temperature of a second wafer to be loaded into a device fabrication system. JOHNSON discloses an epitaxial film, which is considered “a light absorption film as broadly claimed by Applicant in Claim 1.

Note that Claim 1 does not limit the method to a film that absorbs the light emitted from the lamp, since Applicant more broadly claims “heating the second semiconductor layer through the light absorption film”, (*e.g.*, not claiming “heating the second semiconductor layer by the

light absorption film”), so that the claim includes within its bounds the situation wherein the light absorption film need not absorb any of the light from the heating lamps, since that limitation is not claimed.

JOHNSON discloses a method (Col. 1, Line 35 through Col. 2, Line 10) for predicting, using a test wafer 30 (Fig. 6), a temperature of a wafer to be loaded into a lamp heating system including heating lamps 52 and 54 (Col. 4, Lines 32-62), the method comprising the steps of:

a) preparing the test wafer, which includes a first semiconductor layer 32 formed in a crystalline state, a second semiconductor layer 44 formed in an amorphous state on the first semiconductor layer, and a light absorption film (the epitaxial layer; Col. 2, Line 51ff) formed over the second semiconductor layer;

b) loading the test wafer into the lamp heating system and then irradiating the test wafer with a light emitted from the lamp, thereby heating (Col. 4, Lines 49-62) the second semiconductor layer through the light absorption film;

c) calculating a recovery rate at which a part 42 of the second semiconductor layer that has been heated recovers from the amorphous state to the crystalline state at the interface with the first semiconductor layer; and

d) measuring a temperature of the test wafer that has been irradiated with the light, according to a relationship (Col. 6, Lines 8-21) between the recovery rate and a temperature corresponding to the recovery rate.

Broadly considered, the rate determined by JOHNSON, at which the measured sheet resistance changes, is identified as the “recovery rate” as claimed by Applicant, since it is caused by the same physical mechanism as the recovery rate defined in the claim, *i.e.*, “at which a part of the second semiconductor layer that has been heated recovers from the amorphous state to the crystalline state at the interface with the first semiconductor layer” as claimed by Applicant in Claim 1, Lines 10-12.

JOHNSON as described above, does not explicitly disclose the limitations on the wavelength of the light emitted from the heating lamp as claimed by Applicant in Claims 2-4 but these limitations are considered inherent features of the particular material disclosed by JOHNSON for the wafer and the disclosed temperature of the heating lamps. Regarding **Claims 2-4**: Since JOHNSON uses a silicon wafer and heat lamps to heat the wafer in the 450 C to 625

C temperature range, inherently at least a part of the light of the heating lamp will have a wavelength (See Fig. 2 of U.S. Pat. No. 5769540 A, Schietinger, Charles W. *et al.*, hereinafter **SCHEITINGER**) at which the first semiconductor layer transmits the light from the lamp as claimed by Applicant in Claim 2. The heat lamps will inherently emit light having a wavelength in the range from about 1.0 micron to 3.0 microns as claimed by Applicant in Claim 4 (evidence for inherency may be found by looking up the Planck blackbody emission spectrum for the claimed range). Regarding **Claim 3 and 5**: JOHNSON further describes a silicon test wafer and method for predicting a wafer temperature in a heating chamber in the 450 C to 625 Degrees Celsius temperature range, which is within the range claimed by Applicant in Claim 5.

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over DUTARTRE.

DUTARTRE discloses or suggests all the limitations as claimed by Applicant in Claim 1 as described above in Paragraph 10 and further discloses diameters of wafers used industrially are 20 cm (Col. 4, Line 5), and continue to increase. Moreover, DUTARTRE teaches that the wafer temperature must be uniform across the whole wafer (Col. 1, Lines 18-33).

DUTARTRE as described above, does not explicitly disclose the wafer diameter of about 30.5 cm or more as claimed by Applicant.

With respect to Claim 6: the limitations in this claim, absent any criticality, are only considered to be the "optimum" diameter of the wafer disclosed by DUTARTRE, that a person having ordinary skill in the art would have been able to determine using routine experimentation based, among other things, on the desired accuracy, manufacturing costs, etc. See *In re Boesch*, 205 USPQ 215 (CCPA 1980).



Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the wafer disclosed by DUTARTRE having a diameter of about 30.5 cm or more in order to match the size of wafer for which the reactor is designed, in order to predict the temperature distribution across the entire wafer which will be loaded after the test wafer as suggested by DUTARTRE.

14. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

### ***Conclusion***

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art cited in PTO-892 and not mentioned above disclose related temperature measurement devices and methods.

- Regarding JP 11160166A: The temperature of a test wafer is calibrated using a predefined phase transition temperature (T1) of the material. There is no teaching or suggestion of calculating a recovery rate or using a relationship between a recovery rate and temperature in order to predict a temperature of a wafer to be loaded into a lamp heating system, as claimed by Applicant.
- US 6114765 A (Fujii, Kunihiro et al.), sharing a common priority document with the Japanese reference, JP 09-320988, discloses (*e.g.*, see Cols. 12, 15) that it is known to form a titanium film on a polysilicon substrate and then to rapidly thermal anneal the substrate, and to observe phase transitions. Also, see the translation of JP 09-320988 at Paragraph 14. These prior art references do not disclose or suggest a method including calculating a recovery rate using a relationship between a recovery rate and temperature in order to predict a temperature of a wafer to be loaded into a lamp heating system, as claimed by Applicant.
- The other references were cited during prosecution of the PARENT application (09/984,908, now U.S. Patent No. 6,666,577), or were cited by the JPO in a related application in Japan, or share at least some features in common with applicant's disclosure.

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***Conclusion***

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stanley J. Pruchnic, Jr., whose telephone number is (571) 272-2248. The examiner can normally be reached on weekdays (Monday through Friday) from 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego F. F. Gutierrez can be reached at (571) 272-2245.

The ***Official FAX*** number for Technology Center 2800 is (703) 872-9306 for ***all official communications***.

Any inquiry of a general nature or relating to the status of this application or proceeding may be directed to the official USPTO website at <http://www.uspto.gov/> or you may call the **USPTO Call Center** at **800-786-9199** or 703-308-4357. The Technology Center 2800 Customer Service FAX phone number is (703) 872-9317.



**DIEGO F. F. GUTIERREZ  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800**

Stanley J. Pruchnic, Jr.  
3/2/04